

Appln. No. 09/972,953
Amd. dated October 10, 2003
Reply to Office Action of June 10, 2003

Amendment to the Title

METHOD ~~AND APPARATUS~~ FOR THE FORMULATION OF LAMINATED CIRCUIT
HAVING PASSIVE COMPONENTS THEREIN

Amendments to the Specification

Amend the paragraph spanning pages 7-9 as follows:

--The main control unit 90 is programmably controlled to drive the platform 40 and the sprayers 50, 60 and 70 subject to the circuit layout recorded in the data file, causing insulative material, conductive material, and impedance material to be ejected onto predetermined locations on the platform 40 to form the desired laminated circuit 30. During shape forming, the designed circuit layers 20 are formed on the platform 40 one over another. During the formation of one circuit layer 20, the respective electric circuits 22 and passive components 23 are formed on the platform 40, and then the substrate 21 is formed in the other area. In detail, when the main control unit 90 reads in the message that one particular X-Y coordinate should be conductor, it immediately controls the driving unit 80 to move the platform ~~[[30]]~~ 40 to the position right below the jet nozzle 62 of the electrically conductive material sprayer 60, and then drives the jet nozzle 62 to eject a spot of fluid tin silver alloy downwards onto the platform 40 (the spot of fluid tin silver alloy is quickly condensed after been driven out of the jet nozzle 62). If the coordinate is the point to be connected to the circuits of an upper circuit layer, the spraying time of the jet nozzle 62 will be relatively longer,

enabling a protruded connecting portion to be formed on the conductor of ejected tin silver alloy. In the same manner, if a coordinate should be electrically insulative material, the platform 40 is moved to the position right below the jet nozzle 52 of the electrically insulative material sprayer 50, and then the jet nozzle 52 is driven to eject a spot of engineering plastics onto the platform 40. Different passive components 23 (resistors, inductors, capacitors) are formed in different ways. The jet nozzle 72 of the impedance material spray 70 is controlled to eject fluid graphite onto the platform 40 at predetermined locations, forming the desired resistors. By means of controlling the concentration of fluid graphite, resistors of different impedance are obtained. The formation of inductors and capacitors can be made by means of the combining electrically conductive material, electrically insulative material or impedance material. After formation of the electric circuits 22 and passive components 23 of one circuit layer 20, fluid engineering plastics is ejected onto every coordinate at the circuit layer 20 (except the protruded connecting portions 24), forming the desired substrate 21, which is disposed in flush with the topmost edge of the protruded portions 24. After formation of one circuit layer 20, the jet nozzles 52, 62 and 72 are lifted to a distance equal to the thickness of one circuit layer, and then a new

circuit layer is formed on the top side of the duly formed circuit layer 20. This procedure is repeated again and again until the complete of the desired laminated circuit 30.--